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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/804,152

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Kiril A. Pandelisev

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EXAMINER

NGUYEN, THUKHANH T

ART UNIT

PAPER NUMBER

1722

MAIL DATE

DELIVERY MODE

06/18/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.		Applicant(s)	
	10/804,152		PANDELISEV, KIRIL A.	
	Examiner		Art Unit	
	Thu Khanh T. Nguyen		1722	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 389-408 and 410-418 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 389-408 and 410-418 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The amendment filed March 15, 2007 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: paragraphs [0004]-[0006], $0.3 \leq X_2 \leq 1$

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 389-396, 399-401, 405 are rejected under 35 U.S.C. 102(b) as being anticipated by Alliegro et al (3,951,587).

Alliegro et al teach a method for forming tube, paddle and boat for semi-conductor wafer, comprising the step of:

1) selecting silicon or silicon carbide powder (col. 2, lines 33-36, claims 389, 393, 395, 399, 405); wherein the material could be sintered silicon carbide or silicon metal with at least 99% pure silicon (col. 2, lines 30-36) or that silicon carbide is impregnated with silicon metal in the amount of from 5 to 30 percent by weight, which falls between the range of $0 < x < 1$ (col. 6, lines 19-23);

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- 2) presinter heating (col. 4, lines 4-6),
- 3) forming the wafer boat by cold-pressing, isostatic pressing, extrusion, or slip casting (col. 4, lines 22-25), then cooling the material down in order to remove the boat from the mold (col. 2, lines 21-27); and
- 4) mixing the silicon carbide with other organic or inorganic compound (col. 5, lines 29-35);
- 5) machining and cutting the wafer boat (col. 4, lines 8-11) and coating the wafer boat with silicon material (col. 3, lines 20-22).

4. Claims 389-408, 410, and 416-418 are rejected under 35 U.S.C. 102(b) as being anticipated by Brun (6,395,203).

In regard to claim 389, Brun discloses a boat and a method for manufacturing a boat used in semiconductor wafer processing. The boat comprises a high purity silicon melt infiltrated SiC (Si/SiC) with metal impurity of less than 0.5 ppm (col. 3, lines 41-47).

In regard to claims 393 and 410, the process of forming the boat, comprising the step of:

- a) Providing the material selected from the group consisting of silicon and silicon carbide, wherein the amount of silicon is much larger (or high purity) than the silicon carbide, or as the amount of silicon is as much as 4 times the total of other material (col. 5, lines 21 to col. 6, line 26);
- b) forming/casting a wafer boat preform from those material (col. 6, lines 12-13).

In regard to claims 390, 394, 400, and 410, wherein the process also comprises the steps of forming the material in a die having a desired shape and form (col. 6, line 10-13), sintering the

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material or heating the material for 100°C to 550°C or 1450°C depending on the material and the product being form (col. 5, lines 46-49; col. 6, lines 13-14); cooling the preform carrier to room temperature (col. 5, lines 49-50), and machining the carrier (col. 6, lines 22-26).

In regard to claims 391, 395-396, 401, and 416-417, wherein the material could either be organic/inorganic powder or fiber (col. 3, lines 1-6).

In regarding to claim 392, 404, wherein the process further comprises the step of purging or purifying (col. 19-24).

In regard to claims 397-398, 403, wherein the process comprising the step of injecting a stream of gas into the pressing furnace zone during the heat pressing (col. 4, lines 57-66).

In regard to claims 399, 405, wherein the process comprises a step of forming a tube or a plate such as electrical diodes, transistors and circuits (col. 1, lines 7-10) or a wafer boat (col. 6, lines 13).

In regard to claims 402 and 418, wherein the melting is done under vacuum (col. 5, lines 13-17) and gas stream (col. 4, lines 57-66).

In regard to claim 406, Brun further discloses the steps of machining to form slots (col. 6, line 23-25) and coating and fusing a depositing layer to protect the material (col. 2, lines 9-11; lines 27-29).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 411-413 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brun ('203) as applied to claims 389-408, 410, and 416-418 above, and further in view of Boyd et al (6,835,633).

Brun discloses a wafer boat and a process for manufacturing wafer boat as described above, but fails to disclose that the wafer boat is made of silicon germanium.

Boyd et al disclose that the wafer carrier could be of any Si-containing material, such as Si, SiGe, SiGeC, Si/Si, Si/SiC or Si/SiGeC and using any conventional techniques (col. 4, lines 50-61).

It would have been obvious to one of ordinary skill in the art at the time the applicant's invention was made to modify Brun by providing any combination of Si, SiGe, SiGeC, Si/Si, Si/SiC or Si/SiGeC for making wafer carriers/boats as taught by Boyd et al, because all these materials have been proved to be suitable alternative materials for forming wafer boats.

7. Claims 407-408 and 414-415 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brun ('203) as applied to claims 389-408, 410, and 416-418 above, and further in view of Niemiowski et al (6,056,123).

Brun discloses a wafer boat made of silicon as described above, but fails to disclose that the silicon could be crystal and could be a polycrystal silicon.

Niemiowski et al (6,056,123) teach a process for forming wafer boat and a wafer boat having the same composition as the wafers in order to reduce the stresses on both wafers and wafer boat (col. 3, lines 53-59).

Niemirowski et al further discloses a wafer boat manufacturing using polysilicon (abstract), wherein the wafer boat includes a plurality of spaced parallel rods (1) having slots (5) holding in place by polysilicon wedges (2) for supporting a series of semiconductor wafers (col. 2, lines 26-31) and complementary steps (9, 20) to provide alignment and rigidity for the wafer boat (col. 3, lines 22-25), wherein the wafer boat is formed using a CVD process (col. 3, lines 44-48) or any other well known machining techniques (col. 3, lines 13-20), wherein the silicon material is crystal silicon or polycrystal silicon (col. 3, lines 12-16).

In regard to claims 407-408, it would have been obvious to one of ordinary skill in the art at the time the applicant's invention was made to modify Brun by providing a plurality of slots, wedges, and notches on the carrier tube by CVD or any other machinery techniques as taught by Niemirowski in order to form slots for supporting the wafers and to secure the wafer carrier together.

In regard to claims 414-415, it would have been obvious to one of ordinary skill in the art at the time the applicant's invention was made to modify Brun by providing a wafer boat made of single/polycrystal silicon as taught by Niemirowski in order to improve purity and provide a low level of contamination of the wafer (col. 1, lines 47-54 and col. 2, lines 7-9).

Response to Arguments

8. Applicant's arguments filed April 09,2007 have been fully considered but they are not persuasive. The Applicant argued that Alliegro fails to disclose that the article being formed of silicon metal impregnate at least 99% pure silicon or of at least 99% pure silicon carbide (col. 2, lines 30-36).

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9. Since the claims are formatted to include different types of silicon that can be used in the alternative for forming wafer boat, the prior art reference only need to show one of the alternative chemical/compound and still meet the claims. In this case, Alliegro shows that the wafer boat can be made of pure silicon metal and silicon carbide (col. 6, claims 1-8). Wherein the phrase "high purity silicon metal" is considered as silicon.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thu Khanh T. Nguyen whose telephone number is 571-272-1136. The examiner can normally be reached on Monday- Friday, 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gupta Yogendra can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TN

Tim Heitbrink
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6-11-07